

Sound Design for Games

USC School of Cinematic Arts, CTIN 406L

Instructor

David Su

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Office Hours

Mondays 3pm to 5pm on Zoom, by appointment via <https://calendly.com/usdivad/office-hours>

Meeting and Location Information

Class meets in room [SCIL113](#) on Thursdays from 12pm to 2:50pm.

Units

2/2

Discord Server

Beyond the classroom and email, get help, share tricks, stay on top of assignments.
(Invite to be sent after first class session)

Course Description

Sound Design for Games is an introduction into the practical skills and methodology for designing and implementing audio in games.

The course begins with the fundamentals of approaching the job from pre-production to design, using tools to develop professional-quality sounds. The course then transitions to implementation and practice of interactive audio through the use of game and middleware tools, focusing on the theory and practice of using the affordances of interactivity. Students will learn to use the [Unity](#) game engine's suite of audio tools as well as the audio middleware [Wwise](#).

Sound Design for Games is designed as a hands-on, holistic approach to audio implementation inside a game engine. Over the course of the semester, students will build skills and do assignments that culminate in a final project: implementing an explorable 3D space that features a variety of game audio tricks and techniques.

Over the course of the semester, guests will share their own knowledge and experiences and be on hand to answer questions, so participation and attendance is a crucial part of the class. In addition to lecture content, students will get the most out of the class by completing project-based tutorials. The course will also touch on career opportunities within game audio, as well as collaboration between sound designers and game developers.

Finally, the class will look at recent advances and considerations for sound designers in games that are on the horizon, including the proliferation of surround-sound and applications for VR, XR, and notably AR.

Grading and Due Dates

Class Attendance and Participation - 10%

Weekly Assignments - 15%

Week 5 - Project 1 - 12.5%

Week 7 - Project 2 - 12.5%

Week 9 - Project 3 - 12.5%

Week 11 - Project 4 - 12.5%

Week 13-15 - Final Project: Explorable Space - 25%

Course Overview

Week #	Date	Topics/Daily Activities	Readings and Homework	Deliverable/Due Dates
Week 1	1/11	Overview of Class, Role of Audio in Games <ul style="list-style-type: none"> - The creative use of sound in games - The four basic audio disciplines - sound effects, dialogue, music, implementation - Audio team roles in game development - Spotting, breakdowns, the work of sound design 	Game audio scene analysis	
Week 2	1/18	Deliberate Design in Audio, and Digital Audio Tools <ul style="list-style-type: none"> - Sound basics, what is sound, and how do we measure it? - Microphones and recording, analog to digital, digital storage and playback, and an introduction to DAW use 	Sound collage	Game audio scene analysis
Week 3	1/25	Dialogue and SFX, Introduction to Using Sound in Unity <ul style="list-style-type: none"> - Sourcing and editing dialogue and SFX. - Audio manipulation and synthesis - Designing sounds and systems of sounds. - Introduction to using sound in Unity 	Sound redesign Download Unity, familiarize yourself with the interface, do the overview tutorial if new to Unity	Sound collage due
Week 4	2/1	Audio Implementation Fundamentals <ul style="list-style-type: none"> - Introduction to Unity's audio workflow, one-shots vs. loops, listeners, emitters, sound zones, tagging animation for sound 	Unity game sound/music replacement	Sound redesign due

Week 5	2/8	Guest Lecture: Creature Sounds	Project 1 assigned	Unity game sound/music replacement due
Week 6	2/15	Audio Middleware, Ambiences <ul style="list-style-type: none"> - Overview including Wwise and FMOD - Atmospheric - building the world beyond 	Follow Wwise/Unity tutorial: Atmospheric	
Week 7	2/22	Introduction to Dynamically Driven Audio <ul style="list-style-type: none"> - Avoiding repetition, reacting to changes in the world, the world reacting to changes - Foley/Footsteps variations 	Project 2 assigned Follow Wwise/Unity tutorial: Foley	Project 1 due
Week 8	2/29	Interactive Music Approaches <ul style="list-style-type: none"> - Music editing, simple music production, diegesis concepts - Layering, branching, stingers, crossfading, transitions 	Follow tutorial on stems and stingers	
Week 9	3/7	Digital Signal Processing (Audio Effects) <ul style="list-style-type: none"> - Hard FX, variations, and using processing - Interactive props with repetition and reactive environments 	Project 3 assigned Follow Wwise/Unity tutorial: SFX	Project 2 due
Break	3/14			

Week 10	3/21	The Physics of Audio in Games <ul style="list-style-type: none"> - Binaural audio, obstruction and occlusion, reflection and reverb - HRTFs using Steam Audio - Project Acoustics <p>(David will be at GDC so will teach this session remotely via Zoom)</p>	Final project assigned	
Week 11	3/28	Music Mixing and Interactivity <ul style="list-style-type: none"> - Case studies, beat synchronization, procedural music, and audio visualization 	Project 4 assigned Follow tutorial on mixing	Project 3 due
Week 12	4/4	Guest Lecture: Musical Game Mechanics		
Week 13	4/11	Collaboration, Production, Budgeting, Careers in Game Audio		Project 4 due
Week 14	4/18	Guest Lecture: Procedural Audio using Unity + uRTcmix		
Week 15	4/25	Final Projects In-Class Crit		Final project first submission due
FINAL	5/9	Revised Final Projects Due		Revised final project due

Project and Assignment Overview

Class Exercises

- Students will be given several prompts to do introductory sound work in class, designing sounds and replacing audio in a provided game.

Project 1

- Using Unity, create an explorable space with atmospheric and backgrounds. Assignment should include 2 distinct areas with different atmospheres and transition interactively.

Project 2

- Using Unity and Project 1 with middleware (Wwise or FMOD if you prefer), create dynamic footsteps when exploring the spaces. Footsteps should vary and react to the different environments and terrain.

Project 3

- Using Unity and Wwise, create interactive props that vary based on repetition and react to the environments or interactions.
- Examples: a helmet that changes how the player perceives sound when it is worn, a scanner that reacts to the environment, transmitters that tune in stronger or weaker with proximity/the materials surrounding the player.
- You are encouraged to use the environments from Projects 1 and 2.

Project 4

- Using Unity and Wwise, add interactive music (your own or provided by the class) to create basic music that reacts to player actions/positions in the world.
- You are encouraged to use the implementations from Projects 1-3.

Final Project

- Create a new fully explorable audio world using all that you've learned in the class. Your world should feature:
 - 3 unique spaces with different atmospheres
 - Audio that adapts to what you wear/carry
 - A prop with procedural repetition
 - Iconic UI noise
 - Music with stems/stingers
 - Adaptive audio/layered mixing
 - A voice
 - A creature/entity/nonhuman

Reviews and Critiques

In addition to formal testing, projects will also undergo extensive peer review and critique during the class sessions. Students are expected to participate actively in both the giving and receiving of feedback as a crucial part of the design process. These reviews will cover both creative and technical aspects of the project.

Missing an Assignment Deadline, Incompletes

The only acceptable excuses for missing an assignment deadline or taking an incomplete in the course are personal illness or a family emergency. Students must inform the instructors before the assignment due date and present verifiable evidence in order for a deadline extension to be granted. Students who wish to take incompletes must also present documentation of the problem to the instructors or student assistant before final grades are due.

For assignments turned in after the assignment deadline without prior permission from the instructor, a penalty will be imposed equal to 10% of the total available points for the assignment, for each day or part of a day that the assignment is late, up to a maximum of seven days.

Attendance Policy

Punctual attendance at all classes is mandatory. Students arriving more than five minutes late to three classes, more than ten minutes late to a single class, or leaving early, will be marked as having an unexcused absence from class, unless prior permission has been obtained from the instructor. The following guidelines are from the Interactive Media & Games Division handbook regarding absences and grading and apply to all students.

Guidelines for absences affecting grading:

- Two unexcused absences: lowers grade $\frac{1}{2}$ grade (for example, from A to A-)
- Three unexcused absences: lowers grade one full grade
- Four or more unexcused absences: request to withdraw from course (instructor's discretion)

Excused absences are:

- Illness (with a doctor's verification)
- Family or personal emergency (with verification)

Social media use, including text messaging, Internet messaging, and email, is not permitted in class unless explicitly permitted by the instructors. A 0.5% grade reduction will result from each occurrence of a student being found using social media in class.

Creating a Safe Space

In this class, we make a commitment to foster a welcoming and supportive environment where students of all identities and backgrounds can flourish. This means that we will use preferred pronouns and respect self-identifications. While debate and discussion are welcome, please remain aware of the implications of your words and the images that you include in your work. If the instructor or another student points out that something you have said or shared with the group might be offensive, avoid being defensive; this is a valuable opportunity for us to grow and learn together. If you have a concern about any aspect of the class, you are encouraged to speak with the instructor. If you feel uncomfortable speaking with the instructor, you are also welcome to speak with either the undergraduate or graduate advisor for the division, who can discuss the issue with you directly or point you toward other on- and off-campus resources for addressing your concern.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity equity.usc.edu or to the Department of Public Safety dps.usc.edu/contact/report. This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. Relationship and Sexual Violence Prevention and Services (RSVP, formerly known as the Center for Women and Men) <https://sites.usc.edu/clientservices/> provides 24/7 confidential support, and the Sexual Assault Resource Center <https://sarc.usc.edu> describes reporting options and other resources.

Harassment, sexual misconduct, interpersonal violence, and stalking are not tolerated by the university. All faculty and most staff are considered Responsible Employees by the university and must forward all information they receive about these types of situations to the Title IX Coordinator. The Title IX Coordinator is responsible for assisting students with supportive accommodations, including academic accommodations, as well as investigating these incidents if the reporting student wants an investigation. The Title IX office is also responsible for coordinating supportive measures for transgender and nonbinary students such as faculty notifications, and more. If you need supportive accommodations you may contact the Title IX Coordinator directly (titleix@usc.edu or 213-821-8298) without sharing any personal information with me. If you would like to speak with a confidential counselor, Relationship and Sexual Violence Prevention Services (RSVP) provides 24/7 confidential support for students (213-740-9355 (WELL); press 0 after hours).

Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office of Student Judicial Affairs for disciplinary action.

Fair Use

Fair use is a legal principle that defines certain limitations on the exclusive rights of copyright holders. The Interactive Media & Games Division of USC's School of the Cinematic Arts seeks to apply a reasonable working definition of fair use that will enable students and instructors to develop multimedia projects without seeking authorization for non-commercial, educational uses. In keeping with section 107 of the Copyright Act we recognize four factors that should be considered when determining whether a use is fair: (1) the purpose and character of use, (2) the nature of the copyrighted work, (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole, and (4) the effect of the use upon the potential market for or value of the copyrighted work. In general, we regard the reproduction of copyrighted works for the purposes of analysis or critique in this class to be covered by the principle of fair use.

Academic Conduct

Plagiarism

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences, up to and including expulsion from the program and the university. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, Behavior Violating University Standards <https://policy.usc.edu/scampus-part-b/>. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <https://policy.usc.edu/research-and-scholarship-misconduct/>.

You are welcome to make use of code libraries, Unity extensions, and the like, as appropriate to your project. However the substance of the project must be your work, and you must document the sources (links to the original work) in a text file submitted with your project. If you are not sure whether you need to document something, document it. If you are uncertain about what constitutes plagiarism, it is your responsibility to ask the instructor for clarification.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute ornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs dsp.usc.edu provides certification for students with disabilities

and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information <https://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of Blackboard, teleconferencing, and other technology.

Syllabus Updates

This syllabus is liable to change up to the beginning of class and possibly over the semester. Please check the posted syllabus regularly, and note all changes that are shared by the instructor in class.

(Last updated on 1/31/24)